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COMMISSION

2006 RENEWABLE ENERGY INVESTMENT PLAN

STAFF DRAFT REPORT

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ABSTRACT

California state law requires the California Energy Commission to submit an investment plan to the Legislature on or before March 31, 2006, to recommend an allocation of Renewable Resource Trust Fund money collected between January 1, 2007, and January 1, 2012. After receiving public comment on this *2006 Renewable Energy Investment Plan, Staff Draft*, a final investment plan will be prepared for the Energy Commission to consider for adoption and submit to the Legislature. This investment plan is based on policy direction provided in the Governor's response to the *2003 Integrated Energy Policy Report* and the *2004 Integrated Energy Policy Report Update*, as well as the policy recommendations in the *2005 Integrated Energy Policy Report*.

KEYWORDS

The key words for purposes of a search on the California Energy Commission website (www.energy.ca.gov) are as follows:

biomass, California, distributed generation, fuel cell, geothermal, investment plan, photovoltaic, preferred electricity loading order, renewables portfolio standard, renewable energy, repowered renewable energy, Reliable Electric Service Investments Act, solar roofs initiative, solar thermal, Western Renewable Energy Generation Information System, wind energy

TABLE OF CONTENTS

Executive Summary	1
Policy Direction from the Governor and the Integrated Energy Policy Reports	1
Recommended Allocation of Funds for the Renewable Energy Program	2
Continued Flexibility to Adjust to Market Conditions	5
Executive Summary Endnotes	7
Chapter 1: Introduction	1
Legislative Requirements	1
Legislative History	3
Status of Renewable Energy in California	4
Status of Renewable Resource Trust Fund	7
Investment Plan Development Process	9
Key Assumptions and Definitions	10
Estimated Amount Collected Annually 2007 through 2011	10
Resources Eligible for the Renewables Portfolio Standard	10
Reverse Auction	11
Grid-Connected Distributed Generation	12
Renewable Energy Certificates	12
Net Metering	12
Chapter 1 Endnotes	13
Chapter 2: Renewables Portfolio Standard and the New Renewable Facilities Program	15
Policy Context	15
Recommended Change in Program Structure	16
Remove Market Price Referent from the RPS Program	17
Allocate Supplemental Energy Payments through Competitive Reverse Auctions	18
Recommended Allocation	19
RPS Contracts Approved by the CPUC	19
High Price of Natural Gas	20
Authority to Reallocate Funds to Other Elements of Program	22
Chapter 2 Endnotes	23
Chapter 3: Emerging Renewables Program	24
Policy Context	24
Recommended Allocation for Emerging Renewables	25
Chapter 3 Endnotes	26
Chapter 4: Existing Renewable Facilities Program	27
Policy Context	27
Recommended Allocation	28
Recent Incentive Payments to Eligible Existing Renewable Energy Facilities	29
Recent RPS Contracts for Solar Thermal and Solid-Fuel Biomass	29
Estimates of Levelized Cost of Electricity for Solid-Fuel Biomass	29
Federal Production Tax Credit for Open-Loop Solid-Fuel Biomass	30
Capacity Payments Support Biomass Operation in Summer Months	30
Chapter 4 Endnotes	31
Chapter 5: Consumer Information and Market Support Program	32
Policy Context	32
Sustainable Solar Market Development	32
Western Renewable Energy Generation Information System	33
Other Emerging Renewables	34
Recommended Allocation	34
Sustainable Solar Energy Market	35
Western Renewable Energy Generation Information System	35
Other Emerging Renewables	36

General Consumer Information and Market Support.....	36
Needed Flexibility.....	36
Chapter 5 Endnotes	37
Acronyms	38
Bibliography.....	39

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EXECUTIVE SUMMARY

This staff draft *2006 Renewable Energy Investment Plan (2006 Investment Plan)* recommends an allocation of funds collected from January 1, 2007, to January 1, 2012, as required by Senate Bill 1194 (Sher), Chapter 1050, Statutes of 2000, and Assembly Bill 995 (Wright), Chapter 1051, Statutes of 2000. These funds will be collected from January 1, 2007, to January 1, 2012, pursuant to the Reliable Electric Service Investments Act. The allocation of funds is based on policy direction from the Governor, as stated in the Governor's response to the California Energy Commission's *2003 Integrated Energy Policy Report* and the *2004 Integrated Energy Policy Report Update*. In addition, the allocation of funds reflects the policy recommendations in the Energy Commission's Integrated Energy Policy Report Committee's draft *2005 Integrated Energy Policy Report (2005 Energy Report)*, recent payment histories from each of the program elements of the Renewable Energy Program, and staff analysis.

The Energy Commission's Renewables Committee will hold a public workshop on November 14, 2005, to seek public comment on the draft *2006 Investment Plan*.¹ Public comment will be considered in preparing the final *2006 Investment Plan*. The Committee expects the final *2006 Investment Plan* to be considered for adoption by the Energy Commission at its January 18, 2006, business meeting. The *2006 Investment Plan* is due to the Legislature on or before March 31, 2006.

Policy Direction from the Governor and the Integrated Energy Policy Reports

Efficiency and the use of renewable resources are top priorities in California's loading order policy for electricity. The Renewables Portfolio Standard program, accelerated to reach 20 percent of retail sales from renewable energy by 2010 statewide, is central to meeting California's renewable resource goals. However, the *2005 Energy Report* states that the current process for procuring renewable resources is overly complex, delaying the state's ability to achieve its renewable energy goals. One option to address this problem is to award public funds for Renewables Portfolio Standard contracts through auctions for production incentives, with awards conditioned on receiving contracts through the Renewables Portfolio Standard solicitation process.²

This option is consistent with the Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update*, which stated:

California's regulations should provide equivalent incentives for all environmentally attractive new renewable energy, but let competitive forces determine which of these are most economically attractive.³

The Western Renewable Energy Generation Information System is a critical component of Renewables Portfolio Standard implementation, including out-of-state participation. This system will support verification, tracking, and transferring of renewable energy certificates representing renewable energy generation in the Western Electricity Coordinating Council. The Governor's response to the *2003 Energy Report* and the *2004 Energy Report Update* encourages the Legislature "to enable a tradable credit or other system to encourage development of the vast renewable resources available throughout the West."⁴

For emerging renewables, the Governor has introduced the Million Solar Roofs Initiative. In support of the Governor's goals in this area, the California Public Utilities Commission and the Energy Commission are developing the California Solar Initiative in California Public Utilities Commission Rulemaking 04-03-017, which aims to accomplish the Governor's goals under existing statutory authority if pending legislation, such as Senate Bill 1 (Murray) regarding the Governor's Million Solar Roofs Initiative, does not become law.

Regarding existing and new facilities generating energy from solid biomass, the Governor stated that he expects the following statement to be used as the basis for developing energy-related policy:

I support the Biomass Collaborative and its potential for contributing to the diversity of energy resources and have reinvigorated the Interagency Working Group, composed of state agencies with important biomass connections, to develop an integrated and comprehensive state policy on biomass. This policy should include electricity, natural gas, and petroleum substitution potential. It should also reflect the substantial potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. The Energy Commission's Public Interest Energy Research program should support this initiative.⁵

Recommended Allocation of Funds for the Renewable Energy Program

In support of these renewable energy goals and policy priorities, the Energy Commission staff recommends the following allocation of funds collected between January 1, 2007, and January 1, 2012, pursuant to the Reliable Electric Service Investments Act.⁶

- Renewables Portfolio Standard – 38 percent for production incentives or supplemental energy payments for energy generated from new renewable power plants that come online or are repowered after the date legislation is enacted to reauthorize the Energy Commission's Renewable Energy Program. After weighing public information on contracts signed to date without the need for supplemental energy payments and the high cost of

natural gas, we recommend reducing the amount set aside for above-market Renewables Portfolio Standard costs and increasing the flexibility to reallocate funds as needed to address changing market conditions. Current rules for the Renewable Energy Program allow the Energy Commission to transfer money into the New Renewable Facilities Program element, but funds may not be transferred out of this element to serve the needs of other Renewable Energy Program elements. We recommend dropping this constraint to allow maximum flexibility to reallocate funds to achieve the state's renewable energy goals.

In addition, to reduce complexity and increase transparency, we recommend using competitive auctions to allocate these production incentives. Auction awards would be conditioned upon receiving a Renewables Portfolio Standard contract. This approach is supported in the *2005 Energy Report*, which highlighted the three new renewable energy auctions held between 1998 and 2001: "All information submitted in the bids was publicly available, as were the criteria used in the bid selection process. Several stakeholders have recommended a return to the auction process, citing its simplicity and success."⁷ As reported in the Renewable Energy Program's *2005 Annual Report*, there are more than 400 megawatts of renewable energy facilities currently online that receive energy production incentives from the awards provided through these auctions.

- Emerging Renewables – 48 percent for incentives to support the Governor's Million Solar Roofs Initiative to reach 3,000 megawatts of photovoltaic energy in the next 10 years. This amount includes money to repay the \$60 million borrowed from future collection of Renewable Energy Program funds, pursuant to Assembly Bill 135 (Reyes), Chapter 867, Statutes of 2004. It also accounts for about half of the first five years of incentives for this initiative, using the lower estimate (\$1.1 billion) of the program's cost from the June 2005 joint California Public Utilities Commission and California Energy Commission staff California Solar Initiative report.⁸
- Existing Renewables – 10 percent for production incentives for existing solid-fuel biomass facilities only. This recommendation is based on the level of payments from the Existing Renewable Facilities Program element over the past two years, recent contracts for Renewables Portfolio Standard energy, estimates of the levelized cost of energy for solid-fuel biomass, the availability of the federal production tax credit to solid-fuel biomass, and the availability of capacity payments supporting operation during summer months.
- Consumer Information and Market Support Program – 4 percent for consumer information, outreach, and marketing efforts, including the Western Renewable Energy Generation Information System. Initially, most of the funds will be used in support of the Governor's Million Solar Roofs Initiative.

Tables ES-1 and ES-2 summarize the proposed allocation of funding. Table ES-1 shows funding as a percent of the total compared to allocations under Senate Bill 90 (Sher), Chapter 905, Statutes of 1997, and Senate Bill 1038 (Sher), Chapter 515, Statutes of 2002. The proposed allocation of funds for 2007-2012 removes the Customer Credit Program, which was discontinued in 2003, and allocates those funds to the Emerging Renewables Program element of the Renewable Energy Program to support the Governor's Million Solar Roofs Initiative. We also propose

Table ES-1. Recommended Renewable Energy Program Funding Allocations January 1, 2007 – January 1, 2012 (percent)

	SB 90 1998-2001	SB 1038 2002-2007	SB 1038 2002-2007 reallocation of customer credit	Proposed 2007-2012	Change from SB 1038 (% of total)
Renewables Portfolio Standard			51.5%	38%	-13.5%
New Renewables	30%	51.5%			
Emerging Renewables	10%	17.5%	26.5%	48%	+30.5%
Consumer Information and Market Support Program*	1%	1%	2%	4%	+ 3.0%
Customer Credit	14%	10%	0%	0%	-10.0%
Existing Renewables	45%	20%	20%	10%	-10.0%
Total	100%	100%	100%	100%	0.0%

Source: Senate Bill 90 (Sher), Chapter 905, Statutes of 1997, Senate Bill 1038 (Sher), Chapter 515, Statutes of 2002, *2006 Renewable Energy Investment Plan*.

*Previously named the Consumer Education Program.

Table ES-2. Recommended Renewable Energy Program Funding Allocations January 1, 2007 – January 1, 2012 (\$ million)

	SB 1038 2002-2007 excluding interest (\$ million)	Amount spent in FY 2004-2005 (\$ million)	Proposed 2007-2012 excluding interest (\$ million)
Renewables Portfolio Standard			\$266
New Renewables	\$347.63	\$10.70	
Emerging Renewables	\$118.12	\$55.90	\$336
Consumer Information and Market Support Program*	\$6.75	\$0.19	\$28
Customer Credit	\$67.50	\$0.00	\$0
Existing Renewables	\$135.00	\$18.30	\$70
Total	\$675.00	\$85.09	\$700

Source: Senate Bill 1038 (Sher), Chapter 515, Statutes of 2002, California Energy Commission, November 2005, *2005 Annual Report to the Legislature, Committee Report, 2006 Renewable Energy Investment Plan*.

*Previously named the Consumer Education Program.

shifting some funds from the New Renewable Facilities Program and the Existing Renewable Facilities Program element into the Emerging Renewables Program. In addition, we propose allocating a portion of funds from the New Renewable Facilities Program to the Consumer Information and Market Support Program.

Table ES-2 shows the dollar amount allocated by Senate Bill 1038, excluding interest. It also shows the amount paid or encumbered in fiscal year 2004-2005 and the amount proposed for 2007-2012, excluding interest.⁹

The staff recommends that any remaining funds available at the close of 2006 should be rolled over into money available for expenditure between January 1, 2007, and January 1, 2012. Money should roll over as follows: New Renewable Facilities Program funds should be rolled into Renewables Portfolio Standard Program; Consumer Education Program funds should be rolled into the Consumer Information and Market Support Program; Existing Renewable Facilities Program funds should remain in this program, except for funds originally allocated for existing wind energy (Tier 2). These funds should be rolled into the Emerging Renewables Program. Any remaining Emerging Renewables Program funds will stay in the Emerging Renewables Program.

Continued Flexibility to Adjust to Market Conditions

The Energy Commission and the renewable energy market have benefited from the flexibility to reallocate funds through the Energy Commission's guidebook process that was built into Senate Bill 90, although this flexibility was reduced in Senate Bill 1038. The flexibility provided in Senate Bill 90 allowed the Renewable Energy Program to maximize the benefits of Renewable Resource Trust Fund money, as recognized by the California State Auditor, Bureau of State Auditors in its May 2001 *Energy Deregulation* report.¹⁰

For January 1, 2007, to January 1, 2012, we recommend that program eligibility criteria, distribution methods, and reallocation of funds continue to be developed through guidelines. The guidelines may be periodically revised with public input to allow rapid response to changes in the market, make any needed mid-course corrections, and avoid inefficiency.

Senate Bill 1038 restricts reallocation of funds from the New Renewable Facilities Program element to any of the other Renewable Energy Program elements supported by the Renewable Resource Trust Fund. We recommend that this restriction be removed to adjust to changing market conditions. Likewise, we recommend allowing funds to be added to the Existing Renewable Facilities Program to maintain maximum flexibility to respond to market conditions.

We will continue to report reallocation decisions in the annual report to the Legislature, as required by Assembly Bill 2304 (Richman), Chapter 781, Statutes of 2004.

Executive Summary Endnotes

¹ The workshop will begin at 9:00 am in Hearing Room A at the Energy Commission, located at 1516 Ninth Street in Sacramento. Audio from the workshop will be webcast at www.energy.ca.gov/webcast. For additional information, see <http://www.energy.ca.gov/renewables/index.html>.

² California Energy Commission, September 2005, *2005 Integrated Energy Policy Report, Committee Draft*, http://www.energy.ca.gov/2005_energy_policy/index.html, accessed October 3, 2005, p. 94.

³ Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005.

⁴ California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 6.

⁵ California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 14.

⁶ Established by SB 1194 and AB 995 and codified in Public Utilities Code section 399, et seq.

⁷ California Energy Commission, September 2005, *2005 Integrated Energy Policy Report, Committee Draft Report*, CEC-100-2005-007-CTD, http://www.energy.ca.gov/2005_energy_policy/index.html, accessed October 19, 2005, p. 94.

⁸ Before the end of 2005, the Emerging Renewables Program is expected to exhaust \$60 million of the funds to be collected between January 1, 2007 and January 1, 2012, as authorized by Assembly Bill 135 (Reyes), Chapter 867, Statutes of 2004, leaving activities unfunded for 2006, unless additional funding or other measures are utilized. California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, <http://www.energy.ca.gov/renewables/documents/legislature.html>, November 2005, p. 25. The estimated cost of the California Solar Initiative assumes that all of the 3,000 MW receive performance-based incentives. If the 3,000 MW are assumed to be installed with capacity payments, the cost is estimated to be \$1.8 billion. See California Energy Commission Renewable Energy Program and California Public Utilities Commission Energy Division, June 14, 2005, *Joint Staff Recommendations to Implement Governor Schwarzenegger's One Million Solar Roofs Program*, in CPUC, June 14, 2005, Assigned Commissioner and Administrative Law Judge's Ruling Seeking Comment on Staff Solar Report, Rulemaking 04-03-017, http://www.cpuc.ca.gov/WORD_PDF/RULINGS/47004.doc, accessed October 3, 2005, p. 14.

⁹ For further information regarding payment and encumbrances in support of Renewable Energy in fiscal year 2004-2005, see California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, <http://www.energy.ca.gov/renewables/documents/legislature.html>, November 2005.

¹⁰ California State Auditor, Bureau of State Audits, May 2001, *Energy Deregulation*, 2000-134.2, <http://www.bsa.ca.gov/pdfs/reports/2000-134.2.pdf>, accessed October 18, 2005, pp. 48-49.

CHAPTER 1: INTRODUCTION

The California Energy Commission's (Energy Commission) Renewable Energy Program began in 1998 to help increase the amount of renewable electricity used to meet California's growing demand. This program is based on decades of bipartisan legislative and gubernatorial support for renewable energy that have helped to make California a recognized leader in the field.

The Renewable Energy Program provides market-based incentives for new and existing utility-scale facilities powered by renewable energy resources. In addition, it offers consumer rebates for installing new grid-connected, distributed generation renewable energy systems. The program also provides training workshops and informational materials on distributed generation photovoltaic systems for industry, local government, and individuals; tracks renewable energy generation and delivery; and helps inform the public on the purchase, installation, and available incentives for renewable energy.

Legislative Requirements

Assembly Bill 995 (Wright), Chapter 1051, Statutes of 2000, and Senate Bill 1194 (Sher), Chapter 1050, Statutes of 2000, enacted on September 30, 2000, created the Reliable Electric Service Investments Act (RESIA) and extended the collection of a non-bypassable system benefit charge initially established under Assembly Bill 1890 (Brulte), Chapter 854, Statutes of 1996, in September 1996 and distributed pursuant to Senate Bill 90 (Sher), Chapter 905, Statutes of 1997, starting in January 1998.

The RESIA requires the Energy Commission to submit two investment plans for the Legislature's consideration. The first investment plan, *Investing in Renewable Energy Generation in California* (2001), addressed allocation of funds collected from January 1, 2002 to January 1, 2007, and was incorporated into Senate Bill 1038 (Sher), Chapter 515, Statutes of 2002.

This draft *2006 Renewable Energy Investment Plan (2006 Investment Plan)* recommends an allocation of funds collected from January 1, 2007, to January 1, 2012. The allocation of funds is based on the policy direction provided in the Governor's response to the *2003 Integrated Energy Policy Report (2003 Energy Report)* and the *2004 Integrated Energy Policy Report Update (2004 Energy Report Update)*, as well as the policy recommendations in the *2005 Integrated Energy Policy Report, Committee Draft (2005 Energy Report)* and staff and technical support contractor analysis.

Pursuant to the RESIA, each investment plan must support the long-term goal of a fully competitive and self-sustaining California renewable energy supply. The investment plan's objective shall be to increase, in the near term, the quantity of California's electricity generated by in-state renewable energy resources, while protecting system reliability, fostering resource diversity, and obtaining the greatest environmental benefits for California residents. In addition, the plan shall also identify and support emerging renewable energy technologies that have the greatest near-term commercial promise and that merit targeted assistance.

Each investment plan shall also contain specific numerical targets reflecting the projected impact of the plan for increased quantity of renewable generation both overall and from emerging technologies, as well as the increased supply of renewable generation available from facilities not under utility contracts entered into prior to 1996.

In particular, the RESIA states that each investment plan shall recommend funding allocations among the following:

1. Production incentives for new renewable energy, including repowered or refurbished renewable energy facilities.
2. Rebates, buy downs, or equivalent incentives for emerging renewable technologies.
3. Customer credits for renewables not under contract with a utility.¹¹
4. Customer education.
5. Incentives for reducing fuel costs that are confirmed to the satisfaction of the Energy Commission at solid fuel biomass energy facilities in order to provide demonstrable environmental and public benefits, including, but not limited to, air quality.
6. Solar thermal generating resources that enhance the environmental value or reliability of the electricity system and that require financial assistance to remain economically viable, as determined by the Energy Commission.
7. Specified fuel cell technologies, if the Energy Commission makes all of the following findings:
 - The specified technologies have similar or better air pollutant characteristics than renewable technologies in the investment plan.
 - The specified technologies require financial assistance to become commercially viable by reference to wholesale generation prices.
 - The specified technologies could contribute significantly to the infrastructure development or other innovation required to meet the long-

term objective of a self-sustaining, competitive supply of renewable energy.

8. Existing wind-generating resources, if the Energy Commission finds that the existing wind-generating resources are a cost-effective source of reliability and environmental benefits compared with other eligible sources, and that the existing wind-generating resources require financial assistance to remain economically viable, as determined by the Energy Commission.

Legislative History

- AB 1890 established the collection of funds from utility ratepayers through a non-bypassable system benefit charge to support existing, new, and emerging renewable resources and directed the Energy Commission to prepare an investment plan for the distribution of these funds.
- SB 90 subsequently authorized the Energy Commission to establish the Renewable Energy Program to distribute funds collected under AB 1890 and codified the Energy Commission's renewable energy investment plan.
- AB 995 and SB 1194 extended the collection of the system benefit charge.
- SB 1038 authorized the Energy Commission to use funds collected pursuant to AB 995 and SB 1194 for the continued administration and support of the Renewable Energy Program from 2002 through 2006.
- SB 1078 (Sher), Chapter 516, Statutes of 2002, created the state's Renewables Portfolio Standard (RPS) and requires the Energy Commission to take certain action, including establishing a program to provide incentives to cover above-market costs for new renewable power plants in support of the RPS.
- SB 183 (Sher), Chapter 666, Statutes of 2003, amended and recast the provisions of Public Utilities Code sections 383.5 and 445 governing the Renewable Energy Program into Public Resources Code sections 25740 through 25751.
- SB 67 (Bowen), Chapter 731, Statutes of 2003, modified the eligibility requirements for renewable generators located out of state.
- SB 168 (Bowen), Chapter 733, Statutes of 2003, made technical amendments to Public Utilities Code sections 383.5 and 445, which were chaptered out because SB 183 recast those provisions into the Public Resources Code.

- AB 135 (Reyes), Chapter 867, Statutes of 2004, authorized the Energy Commission to immediately use up to \$60 million of the funds in the Renewable Resource Trust Fund (RRTF) for support of the Emerging Renewables Program (ERP) element of the Renewable Energy Program. These funds may only be expended until December 31, 2008, and are subject to the repayment requirements of Public Resources Code section 25751, subdivision (f).
- AB 200 (Leslie), Chapter 50, Statutes of 2005, modified the eligibility requirements for renewable generators located out of state serving the load of utilities such as Sierra Pacific and PacifiCorp that have a limited number of customers in California.

Status of Renewable Energy in California

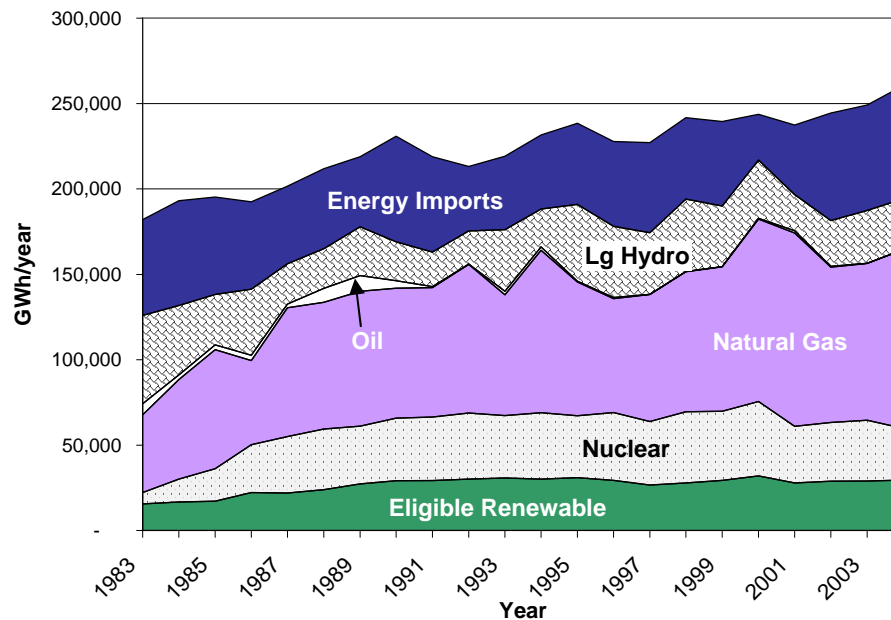
The Renewable Energy Program provides incentives for investment in renewable energy to meet load in investor-owned utility (IOU), electric service provider (ESP), and community choice aggregator (CCA) service areas. To meet statewide goals, publicly owned utilities (POUs) also need to substantially increase their procurement of renewable energy.

Under SB 1078, the state's RPS goal is to reach 20 percent renewables by 2017 statewide. The California Public Utilities Commission (CPUC) and the Energy Commission are working to accelerate this goal to 20 percent by 2010. However, the *2005 Integrated Energy Policy Report – Committee Draft (2005 Energy Report)* states that we are losing ground:

The proportion of renewables in California's electricity mix has actually dropped since 2002, from 11 percent to 10.6 percent statewide. Based on data submitted by IOUs on their progress toward RPS compliance, the shortfall appears to be from non-IOU retail sellers such as POUs, ESPs, and CCAs. Although a number of POUs already report more than 20 percent eligible renewables, in 2003 the state's largest POUs, Los Angeles Department of Water and Power and the Sacramento Municipal Utility District, reported only 1.5 percent and 7 percent renewables, respectively. The newly-elected mayor of Los Angeles, however, recently committed to reaching 20 percent by 2010.¹²

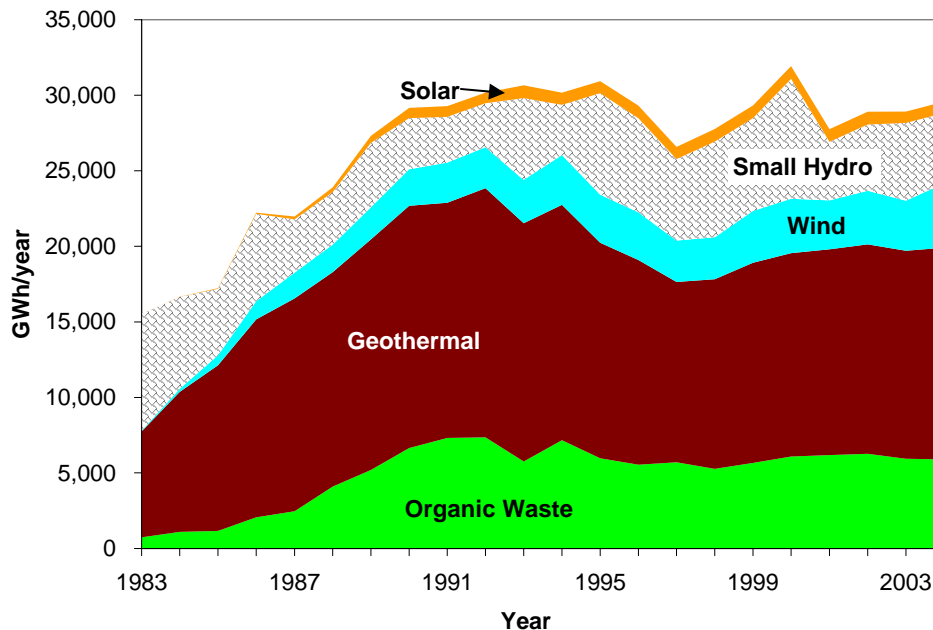
The contribution from renewable energy relative to other sources of California electricity generation is shown in Figure 1. As shown in Figure 2, geothermal provides the largest amount of California's eligible renewable energy generation, followed by biomass. Third is small hydro, followed by wind and concentrating solar power.

Figure 1. California Electricity Generation 1983-2004



Source: California Energy Commission, 1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel), http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS.¹³

Figure 2. California Renewable Electricity Generation by Resource Type 1983-2004

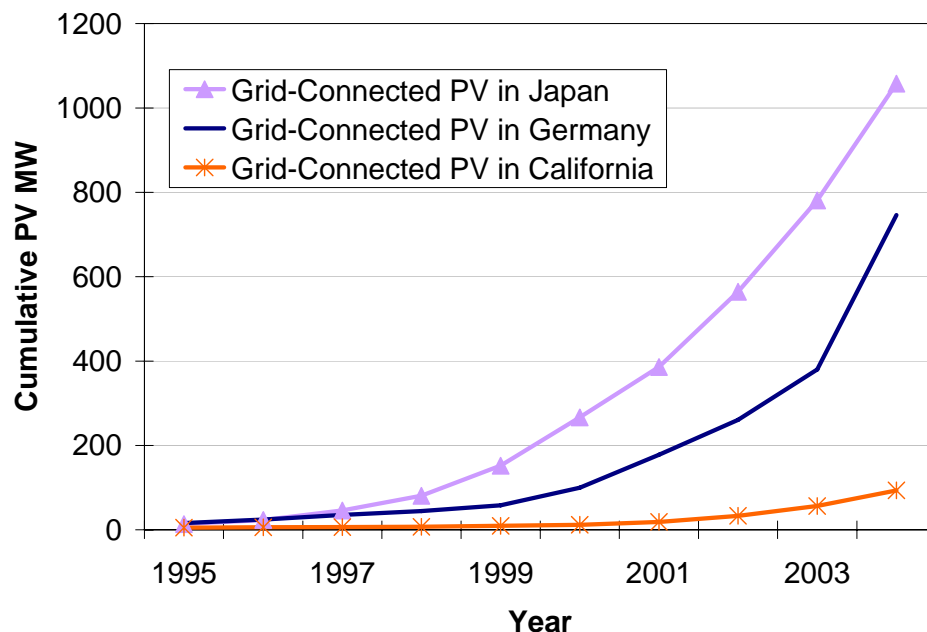


Source: California Energy Commission, 1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel), http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS. The amount shown for small hydro is an estimate prepared by Energy Commission staff, with data for recent years from the Energy Commission's net system power reports.¹⁴

Renewable energy generation from geothermal, biomass, concentrating solar power, and wind in California has increased from about 7,800 gigawatt-hours (GWh) in 1983 to about 24,900 GWh in 2004. The Energy Commission staff estimates that generation from small hydroelectric power (hydro) has fluctuated between 2,900 GWh and 7,900 GWh, depending on precipitation.¹⁵ According to the Energy Commission's *2004 Net System Power Calculation, Commission Report* in 2004, about 4.9 percent of the state's generation came from geothermal, 2.2 percent from biomass, 1.7 percent from small hydro, 1.5 percent from wind, and 0.3 percent from concentrating solar power.¹⁶

In addition, the cumulative amount of grid-connected, distributed generation (DG) photovoltaic (PV) systems in California continues to grow, supported by programs at the Energy Commission, the CPUC, and many POUs. At the end of 2004, California was close to reaching 100 megawatts (MW) of installed DG PV systems. Compared to the cumulative installed capacity in Japan and Germany, however, California is a distant third among the largest PV markets in the world (Figure 3).

Figure 3. Cumulative Grid-Connected Photovoltaic Capacity in Japan, Germany, and California (1995-2004)



Source: International Energy Agency Photovoltaic Power Systems Programme, Annual Report 2004, <http://www.oja-services.nl/iea-pvps/ar04/index.htm>. Solarbuzz, March 14, 2005, 2004 World PV Market Report Highlights, <http://www.solarbuzz.com/Marketbuzz2005-intro.htm>, California Energy Commission, March 31, 2005, "Amount (MW) of Grid-Connected Solar Photovoltaics (PV) in California, 1981 to Present," http://www.energy.ca.gov/renewables/emerging_renewables/GRID-CONNECTED_PV.PDF.

Although the amount of electricity from renewable resources has increased, the amount of electricity from other resources has increased by a greater amount,

causing the proportion of electricity used to meet California load from renewable resources to decline in recent years.

Status of Renewable Resource Trust Fund

From the Renewable Energy Program's creation in 1998 through June 2005, the Energy Commission has disbursed a cumulative total of \$546 million. More than \$229 million is encumbered for projects in progress, with over \$111 million in reserve to meet statutory requirements (Table 1).¹⁷ The following summarizes cumulative funds disbursed by program and market support accomplishments through June 2005:

- The Existing Renewable Facilities Program (ERFP) has helped 275 existing renewable facilities (representing 4,400 MW of renewables capacity) remain competitive or return to service with over \$209 million in funding.
- More than \$49 million has been disbursed to 45 projects from the New Renewable Facilities Program (NRFP), with more than \$140 million encumbered for participating auction winners. Of the 69 active projects that won funding awards, 47 projects are online, representing 488 MW of capacity. When completed, winning projects from the NRFP auctions are expected to bring 1,265 MW of renewables capacity to California's electricity grid. We anticipate many thousands more MW coming online over the next several years as the RPS program matures.
- PV and wind energy systems installed on more than 13,800 homes and businesses are providing nearly 56 MW of distributed capacity, with more than 31 MW in various stages of construction. The ERP has provided rebates totaling \$210 million with an additional \$78 million encumbered for more than 5,000 additional systems. The Solar Schools Program, conducted under the ERP, awarded all of its available funding of \$4.5 million to 33 public and charter schools for the installation of PV systems, representing a total of 732 kilowatts (kW).
- Among customers who entered into direct access contracts with alternative providers, nearly 100 percent purchased renewable electricity products and received customer credits. The Customer Credit Program supported more than 200,000 customer purchases of renewable electricity, with funds totaling more than \$65 million. The Customer Credit Program was discontinued in 2003 as a result of the CPUC's decision to limit direct access.
- Consumers statewide have received information about renewable energy and its benefits via public service announcements, events, radio and television, newspaper, magazine articles, and informational materials. The Consumer Education Program, to be renamed Consumer Information and Market

Support Program, has provided funds totaling more than \$5 million for 20 outreach and demonstration project grants, two consumer education contracts, and one currently active grant project.

The Energy Commission is authorized to reallocate funds in the RRTF among programs in a manner consistent with Public Resources Code (PRC) section 25748(b), which states that,

"Money may be reallocated without further legislative action among existing, new, and emerging technologies and consumer-side programs in a manner consistent with the report [*Investing in Renewable Electricity Generation in California (Investment Plan)*] and with the latest [*Quarterly Report*, April through June 2004] report provided to the Legislature..."

**Table 1 - Renewable Resource Trust Fund
Cumulative Funding and Expenditures as of June 30, 2005
(\$ Millions)¹⁸**

	New Renewable Facilities Program ¹	Existing Renewable Facilities Program ²	Emerging Renewables Program ³	Customer Credit Program	Consumer Education*	PROGRAM TOTAL
Collected Funds ⁴	\$408.711	\$338.890	\$180.928	\$75.639	\$14.980	\$1,019.148
Disbursements	-49.944	-215.366	-210.714	-65.323	-5.068	-546.415
Intrafund Reallocations⁵	33.800	-83.000	77.892	-10.000	0.000	18.692
Encumbrances	-140.068	0.000	-80.895	0.000	-8.533	-229.495
Intrafund Transfer ⁶	-60.000		60.000			0.000
Program Balance	192.499	40.524	27.212	0.316	1.379	261.930
Loan Balance ⁷						-150.000
RRTF Balance						\$111.930

Source: California Energy Commission, Renewable Energy Program, November 2005, *2005 Annual Report to the Legislature, Committee Report*, <http://www.energy.ca.gov/renewables/documents/>.

* We recommend changing the name of this program element to Consumer Information and Market Support.

According to PRC section 25748(b), reallocations may not reduce the allocation for the NRFP nor increase the allocation established for the ERFP. As discussed below, we recommend lifting the restrictions regarding the NRFP and ERFP to allow the

Energy Commission to move funds to or from these program elements to other elements of the Renewable Energy Program if needed.

We recommend that any funds remaining in the Renewable Energy Program available at the close of year 2006 should be rolled over into money available for expenditure between January 1, 2007, and January 1, 2012. Money should roll over as follows: NRFP funds should be rolled into RPS Program; Consumer Education Program funds should be rolled into the Consumer Information and Market Support Program; ERFP funds should remain in this program, except for funds originally allocated for existing wind energy (Tier 2). These funds should be rolled into the ERP. Any remaining ERP funds will remain in the ERP.

Investment Plan Development Process

The Energy Commission's experience developing recommendations and administering the RRTF since 1998 has been an important foundation for this investment plan, including ongoing re-evaluation of market conditions and implementation strategies.

In July 2005, the Energy Commission published *Implementing California's Loading Order for Electricity Resources – Staff Report* in support of the *2005 Integrated Energy Policy Report* proceeding.¹⁹ In Chapter 5, the report discusses the trends and outlook for renewable energy development, including a series of questions for public comment on the future direction of renewable energy programs in California. The questions were discussed at a public workshop on July 25, 2005. The staff report and subsequent public comments were considered by the Energy Commission's Integrated Energy Policy Report Committee in preparing the *2005 Energy Report*, published September 2005, and discussed at a series of public hearings held in September and October.

On August 23, 2005, Governor Schwarzenegger provided policy direction to state agencies in his review of the *2003 Energy Report* and *2004 Energy Report Update*. Concluding that,

The Energy Report is, as I have modified its assessments and recommendations pursuant to Public Resources Code 25307(a-b), a sound basis for energy policy analysis and development, going forward. I expect all state agencies to use it as the common foundation for making their energy-related decisions. Other state agencies are also encouraged to use the modified Energy Report as a basis for their energy-related decisions.²⁰

Accordingly, this draft *2006 Investment Plan* uses the *2003 Energy Report* and *2004 Energy Report Update*, as modified by the Governor's review, as the basis for the recommended allocation of renewable energy program funds collected between January 1, 2007, and January 1, 2012. Consistent with this basis, the draft

2006 Investment Plan also reflects the policy recommendations in the *2005 Energy Report*.

The Energy Commission's Renewables Committee (Committee) will hold a public workshop on November 14, 2005, to seek public comment on the draft *2006 Investment Plan*. Public comment will be considered in preparing the final *2006 Investment Plan*. The Committee expects the final *2006 Investment Plan* to be considered for adoption by the Energy Commission at its January 18, 2006, business meeting. The *2006 Investment Plan* is due to the Legislature on or before March 31, 2006.

Key Assumptions and Definitions

Estimated Amount Collected Annually 2007 through 2011

SB 1194 authorized the collection of \$135 million per year between January 1, 2002, and January 1, 2012, with annual revenue adjustments. Specifically, SB 1194 states:

The amounts shall be adjusted annually at a rate equal to the lesser of the annual growth in electric commodity sales or inflation, as defined by the gross domestic product deflator.²¹

Pursuant to SB 1194, the amount collected in 2005 is projected to be about \$140 million. We used this amount to estimate the amount of funds that would result from the allocations suggested in this investment plan for RRTF money to be collected between January 1, 2007, and January 1, 2012.

Resources Eligible for the Renewables Portfolio Standard

Provided that additional criteria specified in SB 1038, SB 1078, and the RPS guidebooks are met, central station or distributed generation facilities using the following resources are likely to be eligible for the RPS:²²

- Biomass: any organic material not derived from fossil fuels, including agricultural crops, agricultural wastes and residues, waste pallets, crates, dunnage, manufacturing and construction wood wastes, landscape and right-of-way tree trimmings, mill residues that result from milling lumber, rangeland maintenance residues, and wood and wood waste from timbering operations.
- Solar thermal electric: the conversion of sunlight to heat and its concentration and use to power a generator to produce electricity.
- Photovoltaic: a technology that uses a semiconductor to convert sunlight directly into electricity.
- Wind: energy from wind converted into mechanical energy and then electricity.

- Geothermal: natural heat from within the earth, captured for production of electric power.
- Fuel cells using renewable fuels: an advanced energy conversion device that combines hydrogen-bearing fuels with airborne oxygen in an electrochemical reaction to produce electricity very efficiently and with minimal environmental impact.
- Small hydroelectric: a facility employing one or more hydroelectric turbine generators, the sum capacity of which does not exceed 30 MW.
- Digester gas: gas from the anaerobic digestion of organic wastes.
- Municipal solid waste conversion: solid waste as defined in Public Resources Code section 40191.
- Landfill gas: gas produced by the breakdown of organic matter in a landfill (composed primarily of methane and carbon dioxide) or the technology that uses this gas to produce power.
- Ocean wave: an experimental technology that uses ocean waves to produce electricity.
- Ocean thermal: an experimental technology that uses the temperature differences between deep and surface ocean water to produce electricity.
- Tidal current: energy obtained by using the motion of the tides to run water turbines that drive electric generators.

For some resource types, RPS eligibility is contingent upon a number of criteria, including the type of fuel used, environmental impacts (e.g., does not require a new appropriation or diversion of water), whether/when a facility was owned by an IOU, and/or date of commencing commercial operations. For details regarding RPS eligibility please see the *Renewables Portfolio Standard Eligibility Guidebook*.²³

Reverse Auction

This Investment Plan suggests using reverse auctions to allocate supplemental energy payments for the RPS Program. In a normal auction, an item is sold to the highest bidder. In a reverse auction, items are purchased from the lowest bidders. In this case, production incentives for generating RPS-eligible energy will be awarded to the lowest bidders, limited by a maximum acceptable bid. For each auction, bids will be accepted beginning with the lowest price, until funds allocated for the auction are exhausted or all bidders are accepted. Funding awards will be contingent upon signing a long-term California RPS contract, after which projects have a specified time to come online without penalty. Funds to winning bidders will be distributed on a monthly basis over a five-year period according to the amount of renewable energy generated, limited by the terms offered at the time of the auction. The frequency, maximum allowable bid, and amount of funding available for each auction will be adjusted according to trends in renewable energy procurement and natural gas prices.

Grid-Connected Distributed Generation

In addition, this investment plan discusses distributed generation energy systems eligible for incentives from the ERP element. DG is defined as electricity that is generated on-site or near the place of use, typically ranging in capacity from 3 to 10,000 kW; however, to avoid overlapping with the CPUC's distributed generation program, the ERP provides incentives for grid-connected DG systems under 30 kW in size.²⁴ Grid-connected DG is eligible for California's IOU, ESP, and CCA RPS programs, subject to certain rules established by the CPUC.²⁵

Renewable Energy Certificates

A term used in this report that may be unfamiliar to the reader is renewable energy certificate (REC). A REC represents the renewable or "green" attributes of the electricity produced from renewable resources. A REC may be "bundled" with the underlying electricity or "unbundled" and sold separately. If a REC is unbundled from its associated energy, it is often termed a "Tradeable REC." Currently, RPS eligibility requirements specify that RECs must be bundled with the underlying electricity to be eligible for California's RPS.

Net Metering

Another term that may be unfamiliar is "net metering." The term refers to an arrangement with an electric utility that allows the DG owner's electricity meter to spin backwards when the DG system is generating electricity and spin forward when the owner is drawing electricity from the grid. At the end of a 12-month period, there is a balancing of the account. If the DG owner has used more electricity than the DG system generated, the DG owner pays the utility for the electricity. If the DG owner has used less electricity than the DG system generated, the account is reset to zero for the next 12-month period. This arrangement may be perceived as unfair to those who generate more electricity than they use and provides an incentive to match the size of DG systems to the on-site load, even if the potential to generate more renewable electricity goes untapped.

The inability to net meter across more than one electricity meter on a customer's site currently limits further development of biogas DG systems on dairy farms. The capital costs of such systems could be more readily recovered, and systems could be expanded to turn a waste product into an income generating resource if dairies could credit the generation against their total energy use, rather than the individual meter connected to the DG system. Crediting generation across multi-meter facilities would better match the opportunity to harvest manure for electricity generation.

Chapter 1 Endnotes

¹¹ The Customer Credit Program was established to encourage consumers to purchase renewable electricity. Customer Credit incentives were paid to electric service providers registered with the Customer Credit Program. To receive funding the electric service providers were required to submit monthly performance reports including information on the amount of renewable generation procured and the customer credits that had been passed on to customers. In April 2003, the Energy Commission adopted a report for the Governor and Legislature pursuant to former Public Utilities Code Section 383.5 (f)(2)(E) recommending that the Customer Credit Program be discontinued. The Energy Commission subsequently discontinued the program. Payments made in December 2004 concluded Customer Credit activities.

¹² As reported in the Committee Draft 2005 Integrated Energy Policy Report, page 95, citing Patrick McGreevy, "Villaraigosa Appoints New DWP Board," August 16, 2005, <http://www.latimes.com>, accessed August 16, 2005.

¹³ The amount shown for renewable energy does not include photovoltaic energy generation. The amount included for small hydro is an estimate prepared by Energy Commission staff.

¹⁴ The amount shown as solar in this figure does not include photovoltaic energy generation.

¹⁵ California Energy Commission, "1983-2004 California Electricity Generation - (Spreadsheet, Microsoft Excel)," http://www.energy.ca.gov/electricity/ELECTRICITY_GEN_1983-2004.XLS. The amount shown for small hydro is an estimate prepared by Energy Commission staff, with data for recent years from the Energy Commission's net system power reports. This amount excludes energy from renewable distributed generation systems.

¹⁶ California Energy Commission, April 2005, *2004 Net System Power Calculation, Commission Report*, CEC-300-2005-004, <http://www.energy.ca.gov/2005publications/CEC-300-2005-004/CEC-300-2005-004.PDF>, accessed October 14, 2005, p. 3.

¹⁷ Reserved funds are committed to meet legislative mandates, but not yet formally assigned to specific projects. Legislative mandates are as follows: Generation from existing renewable facilities, supplemental energy payments under RPS, rebates for emerging renewable energy system installations, consumer education activities, and a renewable energy certificate tracking and registry system.

¹⁸ ¹ New Renewable Facilities Program encumbrances include \$16.240 million in projects awarded funding under the second and third auctions that do not yet have Funding Award Agreements.

² Existing Renewable Facilities Program disbursements include \$6 million for the Agricultural Biomass-to-Energy Program. ³ Emerging Renewables encumbrance includes \$2.25 million match funding for Solar Schools Program. ⁴ Collected funds do not include \$18,632 in voluntary contributions. ⁵ Intrafund Reallocations include \$10 million transfer from RRTF interest to Emerging Renewables Program and \$8.692 million from state General Fund to Emerging Renewables Program. ⁶ Pursuant to Public Resources Code section 25751(f), the Energy Commission is authorized to transfer funds among program accounts in the RRTF for cash flow purposes, provided that the balance due each program account is restored and the transfers do not adversely affect any of the programs. Beginning in January 2005, AB 135 authorized the use of an additional \$60 million of RRTF funds to be collected from 2007 through 2011, and subject to the repayment requirements of PRC section 25751(f).

⁷ \$150 million and \$8.9 million were loaned to the General Fund and the California Consumer Power and Conservation Financing Authority respectively, pursuant to 2002 Budget Act. The loan to the California Consumer Power and Conservation Financing Authority has been repaid. Note: Program and RRTF Balances are committed funds not yet formally assigned to specific projects, but represent funds reserved to meet statutory requirements: Generation from existing renewable facilities, supplemental energy payments under RPS, rebates for emerging renewable energy system installations, consumer education activities, and a renewable energy certificate tracking and registry system (WREGIS).

¹⁹ After reducing demand through energy efficiency and demand response, the loading order calls for meeting new generation needs first with renewable and distributed generation resources and then with clean fossil-fueled generation. The loading order was adopted by the state's leading energy

agencies in 2003. For further information, see California Energy Commission, July 2005, *Implementing California's Loading Order for Electricity Resources – Staff Report*, CEC-400-2005-043, http://www.energy.ca.gov/2005_energy_policy/documents/index.html#072505, accessed October 5, 2005. Also, see State of California, 2003, *Energy Action Plan*. California Power Authority, California Energy Commission, and California Public Utilities Commission; and State of California, 2005, *Energy Action Plan II*, California Energy Commission and California Public Utilities Commission, both documents are available at http://www.energy.ca.gov/energy_action_plan/index.html, accessed October 5, 2005.

²⁰ Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energy_policy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 14.

²¹ SB 1194 (Sher), Chapter 1050, Statutes of 2000, http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_1151-1200/sb_1194_bill_20000930_chaptered.pdf, accessed October 25, 2005.

²² See Energy Commission, *Renewables Portfolio Standard Eligibility Guidebook*, 500-04-002F; Energy Commission, *Renewables Portfolio Standard Overall Program Guidebook*, 500-04-026; and Energy Commission, *New Renewable Facilities Program Guidebook*, 500-04-001F.

²³ California Energy Commission, August 11, 2004, *Renewables Portfolio Standard Eligibility Guidebook*, 500-04-002F1, <http://www.energy.ca.gov/portfolio/documents/index.html>, accessed October 18, 2005.

²⁴ Small wind systems of up to 50 kW in size may participate in the Emerging Renewables Program, but the rebates for such systems are limited to less than 30 kW.

²⁵ See CPUC Decision 02-10-062, which states that only new renewable distributed generation installations are eligible for the RPS (existing renewable distributed generation does not count toward the utility's RPS calculation). In Rulemaking 01-10-024, "Interim Opinion," http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/20249.doc. See also, D. 05-05-011, "Order Clarifying Participation of Renewable Distributed Generation in the Renewable Portfolio Standards Program," http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/46213.htm.

CHAPTER 2: RENEWABLES PORTFOLIO STANDARD AND THE NEW RENEWABLE FACILITIES PROGRAM

The CPUC and the Energy Commission administer the RPS program for IOUs, ESPs, and CCAs, although rules for the latter two types of load-serving entities have not yet been developed. Nonetheless, ESP and CCA obligations to meet 20 percent renewables by 2017, accelerated by the CPUC to 20 percent by 2010, began accumulating on January 1, 2003. Publicly owned utilities are responsible for implementing their own RPS programs.

Table 2 shows the progress of California's largest three IOUs in meeting the state's RPS and provides a reference to their current RPS solicitations.

Table 2. California Investor-Owned Utilities Progress toward 20 percent Renewables by 2010

IOU	2001	2004	2005 RFOs
PG&E	8.9%	12%	www.pge.com/renewableRFO
SCE	16.6%	18.2%	www.SCE.com/RenewRFP
SDG&E	1.0%	4.5%	www.sdge.com/renewablerfo

Source: California Energy Commission, July 2005, *Implementing California's Loading Order for Electricity Resources, Staff Report*, CEC-400-2005-043, Appendix A, http://www.energy.ca.gov/2005_energypolicy/documents/index.html#072505

Policy Context

After energy efficiency and demand response, California's loading order policy for electricity states that new generation should be fueled by renewable resources. The RPS program, accelerated to reach 20 percent by 2010 statewide, is central to meeting California's renewable resource goals. However, the *2005 Energy Report* states that the current process for procuring renewable resources is overly complex, delaying the state's ability to achieve its renewable energy goals. To address this problem, we recommend awarding public funds for RPS contracts through reverse auctions for production incentives, with awards conditioned on receiving contracts through the RPS solicitation process.²⁶

California and other members of the Western Electricity Coordinating Council (WECC) have a broad and varied mix of renewable energy potential, ranging from resource rich areas that require new transmission to aging or off-line renewable facilities that should be repowered. This is particularly important for the state's aging wind facilities, as stated in the *2005 Energy Report*:

The state needs to focus on repowering its aging wind facilities, both to increase the amount of renewable generation from these prime sites and reduce the number of bird deaths associated with the operation of wind turbines. The state also needs to pursue additional research and development activities at the Energy Commission and the California Independent System Operator to address the impacts of integrating intermittent renewable resources, such as wind, into the state's transmission system.²⁷

In addition to the RPS, which focuses on electricity generation from renewable resources, the state is exploring the development of renewable energy as alternative sources of natural gas production:

To further diversify California's natural gas supply sources, the state can examine the feasibility of increasing natural gas production from more innovative sources. For example, California is rich in biomass resources that are suitable as feedstock for gasification technologies. Landfills in California currently produce natural gas, some of which is captured, cleaned, and used. Agricultural waste can be converted to synthetic natural gas. Underground gaseous reservoirs contain natural gas that does not meet pipeline specifications but could still be converted to useful energy. Technological and cost challenges remain in all areas to ensure that produced gas meets quality specifications and environmental protection requirements, challenges that are appropriate subjects of the state's natural gas research and development program.²⁸

Recommended Change in Program Structure

Pursuant to policy direction in the *2005 Energy Report*, the staff recommends that the market price referent (MPR) be removed from the RPS program. The MPR establishes a benchmark such that winning bids priced below or equal to the MPR will be considered *per se* reasonable by the CPUC.

Currently, the MPR is also used as a criterion for eligibility for supplemental energy payments (SEPs): bids that exceed the MPR may be eligible for SEPs from the NRFP for up to the difference between the bid price and the MPR.

We recommend changing the award of SEPs to a transparent reverse auction for energy products from eligible new or repowered facilities, with awards contingent upon signing a long-term RPS contract with an IOU, ESP, CCA, or third-party procurement entity.

Remove Market Price Referent from the RPS Program

The MPR for California's RPS program for IOUs has required substantial time and resources from state agencies and stakeholders during the past three years that could have been spent negotiating RPS contracts instead.

By using a reverse auction process, the allocation of supplemental energy payments will be independent of the MPR. As a result, the MPR would serve solely as a benchmark for reasonableness of contracts submitted to the CPUC, rather than a trigger point for generators to apply for SEPs. Although this new function for the MPR is valuable, the CPUC plans to integrate renewable energy procurement with its long-term procurement proceeding to the extent feasible. In the long-term procurement proceeding, the CPUC judges contract reasonableness without the use of an MPR.

In the *Preliminary Stakeholder Evaluation of the California Renewables Portfolio Standard, Contractor Report*, a number of stakeholders suggested eliminating the MPR. It was argued that this would reduce administrative complexity and encourage utilities to seek lower cost contracts, provided that the current system remains operational until request for offers (RFOs) can be released under a revised system. Specifically, the report explains:

Some respondents noted the skewed incentives created by the MPR/[supplemental energy payment] SEP: utilities may be indifferent to the cost of different contracts if those contracts exceed the MPR and may instead seek to select projects based on factors other than cost...

[S]ome concerns have been raised about the impact of the MPR on solicitation responses and bid prices. Consistent with these concerns, two developers that voiced support for the MPR noted that the MPR offered a useful starting point for price negotiations, exactly what the state's policymakers have tried to guard against. By this line of reasoning, elimination of the MPR might be expected to lower renewable energy contract prices somewhat.

Though a certain amount of support was expressed for these changes in theory, these views are not shared by all; some respondents reported strong support for the current system, including at least two of the utility respondents. In fact, the utility respondents noted that the MPR offers a useful benchmark of reasonableness and that using SEPs to cover any "above-market" costs is appropriate. Perhaps more telling, many of those respondents that suggested the elimination of the MPRs and SEPs expressed concern about the possible delays that might be required to shift the policy towards a new system; some of these respondents felt that more experience with the present system was needed before making a fundamental policy shift.²⁹

Allocate Supplemental Energy Payments through Competitive Reverse Auctions

The auctions will be designed to implement the Governor's direction that:

California's regulations should provide equivalent incentives for all environmentally attractive new renewable energy, but let competitive forces determine which of these are most economically attractive.³⁰

To help broaden competition and put downward pressure on price, the staff recommends the CPUC encourage the participation of shaped and firmed renewable energy products, provided that the renewable energy is generated from a new or repowered eligible resource, as defined in SB 1038. To increase competitive forces in the allocation of funds, both in-state and out-of-state RPS-eligible renewable energy facilities interconnected to the WECC should be allowed to compete in these auctions for SEPs.

Money allocated through these auctions is intended to support achieving the goal of 20 percent renewable electricity by 2010 statewide, recognizing the Governor has asked the Energy Commission to study extending this goal to 33 percent by 2020. Accordingly, RPS reverse auction awards will be contingent upon signing a long-term RPS contract with an IOU, or other allowable arrangement established by the CPUC for ESPs and CCAs serving electric load in California.

The frequency of auctions, maximum allowed for individual bids, and amount to be auctioned will be determined by the Renewables Committee based on market conditions. If conditions warrant, the Renewables Committee may also consider limiting bids to general energy product categories (e.g., summer peaking energy). If money allocated for RPS SEPs is not needed, we recommend that the Energy Commission be given the authority to reallocate funds to other elements of the Renewable Energy Program.

Other aspects of the auctions would be based on the guidelines for the most recent auction held pursuant to SB 90 and updated as needed to reflect RPS requirements and current market conditions.

Table 3 shows the resource mix of facilities that were allocated production incentive awards through the three auctions held for SB 90 new renewable resource funds.

The staff also recommends changing the name of the NRFP to the Renewables Portfolio Standard Program to better reflect its purpose to support long-term RPS contracts with new or repowered renewable energy facilities to reach 20 percent eligible renewable energy by 2010 statewide, with the possible subsequent goal of 33 percent eligible renewable energy by 2020.

Table 3. SB 90 Auction Results for New Renewable Resources

Technology	MW Online	Total MW Bid	MW Cancelled	MW Not Online
Wind	348	986	3	635
Geothermal	59	157	-	98
Landfill Gas	36	77	27	13
Small Hydro	31	33	-	2
Biomass	11	19	8	-
Digester Gas	2	2	-	-
Waste Tire	-	30	-	30
Total MW	488	1,304	38	777

Source: California Energy Commission, Renewable Energy Program Staff, October 18, 2005.

Recommended Allocation

We recommend allocating 38 percent of the funds collected between January 1, 2007, and January 1, 2012 for production incentives for energy generated from new power plants that come online or are repowered after the date legislation is enacted to re-authorize the Energy Commission's Renewable Energy Program. This recommendation is based on public information on RPS contracts approved by the CPUC through October 2005, none of which requires SEPs, and the high price of natural gas.

RPS Contracts Approved by the CPUC

Table 4 lists the RPS contracts for new or repowered renewable energy that have been approved by, or submitted to, the CPUC through October 2005. Most of the capacity of the RPS contracts to date uses solar thermal electric technology. None of these contracts requires SEPs.

Table 4. IOU RPS Contracts for New or Repowered Renewables by Technology (MW)

	PG&E	SCE	SDG&E	TOTAL
Wind	167 – 190	121 – 345	358	646 – 893
Wind Repowering	84 – 99	37	0	120 – 135
Geothermal	0	30 – 120	0	30 – 120
Biomass	18	12 – 37	75	106 – 131
Solar Thermal Electric	0	500 - 850	300 - 900	800 – 1750
Small Hydropower	0	0	5	5
TOTAL	269 - 306	700 - 1389	738 - 1338	1707 – 3033

This table includes contracts for new and repowered renewable energy capacity submitted to or approved by the CPUC since 2002 updated through October 28, 2005. Capacity additions do not include four contracts that SCE signed under its 2002 RFO, as at least one of those contracts has been terminated (TrueSolar), and information on the resource type and/or project size of the other three is not publicly available. RPS contracts executed to date are priced at or below the MPR and will not need supplemental energy payments.

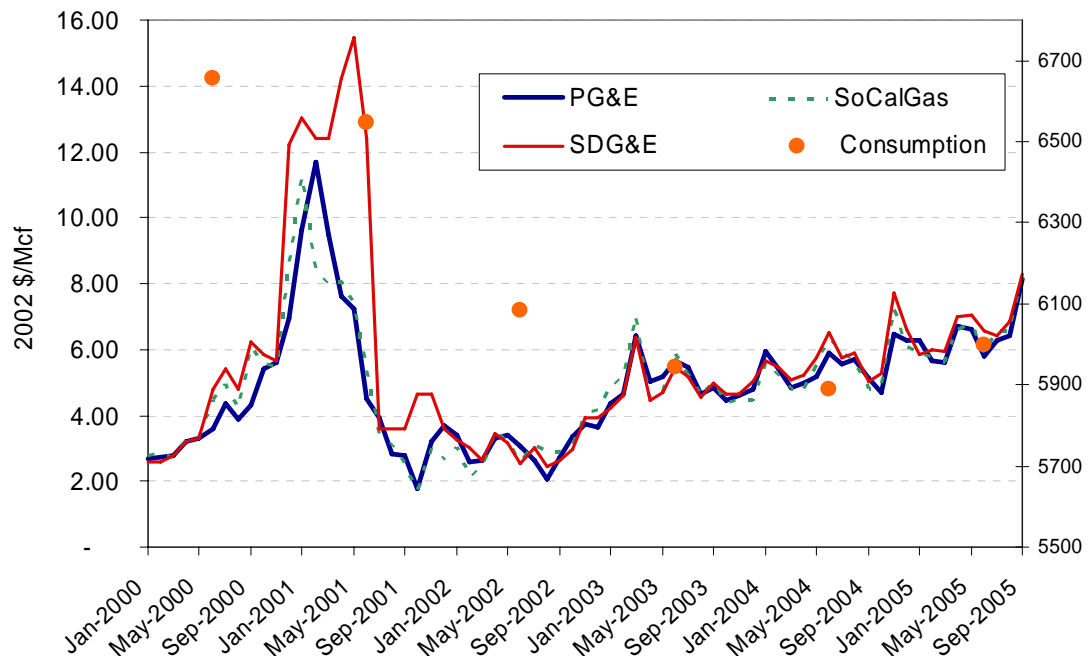
Source: Energy Commission RPS staff and Wiser et al (October 2005), *The Electricity Journal*, Vol. 18, Issue 8, pp. 1040-6190.

High Price of Natural Gas

As the price of natural gas rises, a wider variety of renewable energy sources are likely to become competitive, reducing the aggregate amount of funds needed for SEPs to reach the state's RPS goals. Also, increasing the fuel diversity in California's electricity generation sector will reduce the potential impact of rising natural gas prices and the price of electricity to end users in California.

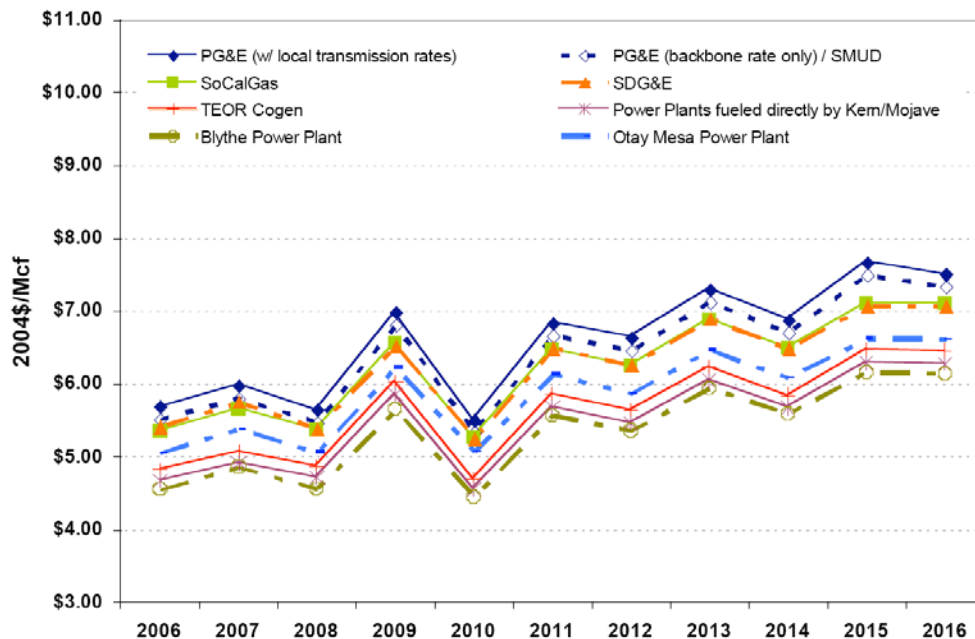
As shown in Figure 4, the weighted average cost of natural gas for California gas utilities has varied widely from January 2000 through September 2005, with the prices generally rising during the past three years. As stated in the *2005 Energy Report – Committee Draft*, half of the gas consumed in California is used to generate electricity: "Consequently, any disruptions to supply or spikes in price directly affect the state's ability to generate electricity and to do so at competitive prices" (p. 104). In 2004, natural gas fueled more than half of California's in-state electricity generation.³¹

Figure 4: California Gas Utilities Weighted Average Cost of Gas and California Consumption (MMcfd, monthly)



Source: Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric, as cited in *2005 Integrated Energy Policy Report – Committee Draft*.

Figure 5. Gas Price Forecast: California Electricity Generators



Source: California Energy Commission, September 2005, *Revised Reference Case in Support of the 2005 Natural Gas Market Assessment, Staff Report*, CEC-600-2005-026-REV, <http://www.energy.ca.gov/2005publications/CEC-600-2005-026/CEC-600-2005-026-REV.PDF>

The Energy Commission revised staff report on the 2005 reference case for natural gas prices from 2006 through 2016 projects the trend of rising natural gas prices will continue. Figure 5 shows the projection for California electricity generators; natural gas prices for California electricity generators are anticipated to increase about 20 percent over the next 10 years.

Authority to Reallocate Funds to Other Elements of Program

As stated above, we recommend authorizing the Energy Commission to reallocate funds from the NRFP element to other elements of the Renewable Energy Program through the public guidebook revision process as needed to address changing market conditions.

Chapter 2 Endnotes

²⁶ California Energy Commission, September 2005, *2005 Integrated Energy Policy Report, Committee Draft*, http://www.energy.ca.gov/2005_energypolicy/index.html, accessed October 3, 2005, p. 94.

²⁷ California Energy Commission, September 2005, *2005 Integrated Energy Policy Report – Committee Draft*, p. E-5.

²⁸ California Energy Commission, September 2005, *2005 Integrated Energy Policy Report – Committee Draft*, pp. 115-116.

²⁹ California Energy Commission, June 2005, *Preliminary Stakeholder Evaluation of the California Renewables Portfolio Standard, Consultant Report*, prepared by KEMA-XENERGY Team, CEC-300-2005-011, <http://www.energy.ca.gov/portfolio/documents/index.html>, accessed October 19, 2005, p. 18.

³⁰ Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005.

³¹ California Energy Commission, July 29, 2005, "California's Major Sources of Energy," <http://www.energy.ca.gov/html/energysources.html>, accessed October 16, 2005.

CHAPTER 3: EMERGING RENEWABLES PROGRAM

The ERP offers incentives for the following grid-connected DG emerging renewable energy resources: PV, solar thermal electric, small wind, and renewable-source fuel cells. Grid-connected DG PV systems represent the overwhelming majority of rebate applications and payments from the ERP. To avoid overlap with the CPUC Self-Generation Incentive Program, the ERP does not provide rebates to systems 30 kW or larger.

Currently, the rebate for eligible PV systems is \$2.80 per watt, with rebates for owner-installed systems discounted by 15 percent. For eligible solar thermal electric and renewable-source fuel cells, the rebate level is \$3.20 per watt. For the first 7.5 kilowatts (kW) of small wind, the rebate level is \$1.70 per watt. For increments above 7.5 kW the rebate is \$0.70 per watt. The Energy Commission has been reducing these rebate levels over time in response to market trends.

Under SB 1038, 17.5 percent of funds collected between January 1, 2002, and January 1, 2007, were allocated to the ERP, about \$118 million over five years. In 2004, 9 percent (\$60.75 million) of SB 1038 funds originally allocated to the Customer Credit Program were reallocated to the ERP, bringing the ERP allocation to 26.5 percent. In response to changing market conditions, additional funds have been reallocated from other elements of the Renewable Energy Program, consistent with the Energy Commission's authority under SB 1038 and PRC section 25748(b). In fiscal year 2004-2005 alone, the ERP paid \$55.9 million in rebates.

Policy Context

The Governor's Million Solar Roofs Initiative is the driving policy initiative for emerging renewables during the period covered by this investment plan. The Governor's Million Solar Roofs Initiative aims to achieve 3,000 MW of PV capacity in the next 10 years. In support of the Governor's goals in this area, the CPUC and the Energy Commission are developing the California Solar Initiative (CSI) in Rulemaking 04-03-017, which aims to accomplish the Governor's goals under existing statutory authority if pending legislation, such as Senate Bill 1 (Murray) regarding the Governor's Million Solar Roofs Initiative, is not passed into law. The CPUC plans to issue a decision launching the CSI before the end of 2005.

In addition, federal revenue sources for emerging renewables have changed as a result of the U.S. Energy Policy Act of 2005 (section 1335 and section 1337).³² Homeowners can receive a tax credit for 30 percent of the cost of a PV system not to exceed \$2,000. Businesses can receive a credit of up to 30 percent of the cost of an installed PV system. These tax credits apply to systems completed in 2006 or 2007, but exclude solar systems used for swimming pools or hot tubs.

Similar federal tax credits are available for homeowners and businesses installing fuel cells, although the maximum tax credit a homeowner can receive is \$500 for each half kW. Businesses can claim a 30 percent investment tax credit for qualified fuel cell equipment.

Recommended Allocation for Emerging Renewables

Consistent with recent years' expenditures from the ERP, we recommend allocating 48 percent of the funds collected between January 1, 2007, and January 1, 2012, for incentives to support the Governor's Million Solar Roofs Initiative. This allocation would provide about \$336 million for five years. Subtracting the \$60 million borrowed forward pursuant to AB 135, this would provide an average of about \$55.2 million per year.

In fiscal year 2004-2005, the Energy Commission paid about \$55.9 million for rebates for more than 4,100 completed projects located in IOU service areas, compared to \$70.1 million for about 4,360 systems in fiscal year 2003-2004.³³

Although the proposed allocation is slightly less than the amount paid in fiscal year 2004-2005 this amount of funding is anticipated to support a growing number of PV systems, as rebate levels decline to match expected reductions in PV system costs. Using the lower estimate (\$1.1 billion) of the California Solar Initiative program's cost from the June 2005 CSI report, this allocation should provide about half of the first five years of CSI incentives.³⁴ The CSI report recommends allocating half of the funds for residential systems (defined as under 10 kW) and half for commercial systems.

The proposed allocation of funds for 2007-2012 transfers funds from the discontinued Customer Credit Program element to the ERP to support the Governor's Million Solar Roofs Initiative. The proposed allocation would also shift some money from the NRFP and the ERFP to reflect changing market conditions that have reduced the need for funding in those programs.

Recognizing that the Governor's solar roofs initiative is still being developed, we recommend using the program's guidebook development and revision process to provide the flexibility to move funds out of the ERP to other elements of the Renewable Energy Program in response to changing market needs.

Chapter 3 Endnotes

³² Public Law 109-58 (HR 6). Section 1335 is available at <http://www.dsireusa.org/documents/Incentives/US37F.htm>, and section 1337 is available at <http://www.dsireusa.org/documents/Incentives/US02Fa.htm> accessed October 15, 2005.

³³ California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, <http://www.energy.ca.gov/renewables/documents/legislature.html>, November 2005, p. 24.

³⁴ Before the end of 2005, the Emerging Renewables Program is expected to exhaust \$60 million of the funds to be collected between January 1, 2007, and January 1, 2012, as authorized by Assembly Bill 135 (Reyes), Chapter 867, Statutes of 2004, leaving activities unfunded for 2006, unless additional funding or other measures are utilized. California Energy Commission, *2005 Annual Report to the Legislature, Committee Report*, <http://www.energy.ca.gov/renewables/documents/legislature.html>, November 2005, p. 25. Regarding the estimated cost of the CSI, California Energy Commission Renewable Energy Program and California Public Utilities Commission Energy Division, June 14, 2005, *Joint Staff Recommendations to Implement Governor Schwarzenegger's One Million Solar Roofs Program*, in CPUC, June 14, 2005, Assigned Commissioner and Administrative Law Judge's Ruling Seeking Comment on Staff Solar Report, Rulemaking 04-03-017, http://www.cpuc.ca.gov/WORD_PDF/RULINGS/47004.doc, accessed October 3, 2005, p. 14.

CHAPTER 4: EXISTING RENEWABLE FACILITIES PROGRAM

Under SB 1038, the ERFP pays incentives to eligible biomass, solar thermal, and wind energy facilities to provide support while they transition to a competitive market for their renewable energy products. Publicly available information indicates that solar thermal and wind receive enough revenue from other sources to cover their needs; however, solid-fuel biomass warrants continued support, although at a lower level than provided in SB 1038. Progress to increase the competitiveness of biomass in the electricity, transportation, and municipal solid waste reduction markets has been stymied by a failure to coordinate policy development across these sectors.

California has significant biomass resources, with 1,000 MW of generating capacity accounting for more than 2 percent of the state's electricity mix. When properly configured to control nitrous oxide emissions and minimize the environmental impacts of transporting waste materials used as fuel, biomass has strategic value as a renewable resource that can help meet the state's RPS goals while also capturing social, economic, and environmental benefits and improving transmission reliability.

There are 28 existing solid-fuel biomass facilities participating in the ERFP.³⁵ In addition, several offline biomass facilities have indicated an interest in restarting, provided they can secure sufficient revenue and ample fuel sources.

Policy Context

The intent of the ERFP is to foster a self-sustaining market for existing renewable energy facilities. Toward that end, the ERFP plans to lower incentive levels over time. Regarding biomass, SB 1194 states that to help increase the competitiveness of electricity generated from biomass, the program should provide:

Incentives for reducing fuel costs that are confirmed to the satisfaction of the Energy Commission at solid fuel biomass energy facilities in order to provide demonstrable environmental and public benefits, including, but not limited to, air quality.³⁶

Originally, support for existing renewables was planned for only four years and was to be phased out by 2002. According to the 1997 *Policy Report on AB 1890 Renewables Funding*, "the proposal aims to maintain the benefits of the renewables industry by providing support that reflects industry needs, while encouraging movement toward a competitive market by the end of the AB 1890 funding period."³⁷ However, SB 1038 extended the program for an additional four years. It has taken

longer than anticipated to aid existing renewables through their transition to reduce costs and renegotiate contracts to generate sufficient revenues to meet their needs.

In his response to the *2003 Energy Report*, Governor Schwarzenegger reiterated the importance of competitive processes as a central principle of the state's renewable energy policy. In addition, the Governor stated that he expects the following to be used as the basis for developing energy-related policy for biomass:

I support the Biomass Collaborative and its potential for contributing to the diversity of energy resources and have reinvigorated the Interagency Working Group, composed of state agencies with important biomass connections, to develop an integrated and comprehensive state policy on biomass. This policy should include electricity, natural gas, and petroleum substitution potential. It should also reflect the substantial potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. The Energy Commission's Public Interest Energy Research program should support this initiative.³⁸

An integrated approach to convert biomass waste to fuel for both electricity and transportation takes on added importance in the context of the Governor's greenhouse gas (GHG) reduction goals to reduce GHG emissions to 2000 levels by 2010; reduce GHG emissions to 1990 levels by 2020; and reduce GHG emissions to 80 percent below 1990 levels by 2050.³⁹ When living, biomass sequesters carbon dioxide. This carbon dioxide is released when the biomass decays, burns, or is used to generate electricity. For this reason, biomass is considered to have a net zero effect on carbon dioxide emissions. If fossil fuels are used to transport biomass, then a net increase in carbon dioxide emissions results. To the extent that transportation fuels derived from biomass or other renewable energy sources are used to haul biomass fuels, this impact can be reduced.

Another way to reduce GHG emissions emitted by organic wastes is to expand the generation of electricity from dairy manure. This could be accomplished by allowing dairies to credit on-site generation to the total electricity use at a dairy, rather than limiting credit to the single meter that is connected to the biogas generator.

Recommended Allocation

We recommend that 10 percent of the funds collected between January 1, 2007, and January 1, 2012, be allocated to the ERF for biomass facilities. This recommendation is based on the level of payments from the ERF during the past few years, recent contracts for RPS energy, estimates of solid-fuel biomass costs from the Energy Commission's Public Interest Energy Research, Demonstration, and Development Program and the Renewable Energy Program, the availability of the federal production tax credit (PTC) to solid-fuel biomass, and recent information

from the biomass industry regarding the availability of capacity payments supporting their operation during the summer months.

Recent Incentive Payments to Eligible Existing Renewable Energy Facilities

Existing wind facilities have been competitive during the past two fiscal years, and have not required incentives from the ERFP. About \$1 million was paid to wind in 2003 for generation in 2002, but no payments were made in 2004 or 2005 to date.

In fiscal year 2004-2005, \$18.3 million was paid to eligible existing renewable biomass and solar thermal facilities. Similar amounts were paid over the two previous fiscal years. Payments for solid-fuel biomass facilities for calendar year 2004 were about \$17 million. For calendar year 2003, solid-fuel biomass facilities received about \$16 million. Payments for existing solar thermal electric facilities for calendar year 2004 were about \$1.5 million. For calendar year 2003, solar thermal facilities received about \$1.4 million.

Recent RPS Contracts for Solar Thermal and Solid-Fuel Biomass

Recent RPS solicitations have resulted in two contracts for new facilities using solar thermal energy. Neither contract requires incentive payments from the NRFP, indicating that this capital-intensive technology can succeed through available contract revenue alone. Compared to new facilities, existing solar thermal electric facilities built in the 1980s should have lower costs because payments for capital cost debt should be nearly complete.

In addition, two solid-fuel biomass re-start facilities have signed bilateral RPS contracts with PG&E. Because they were negotiated outside of an RPS solicitation, neither contract is eligible for support from the NRFP. However, these two facilities may be eligible to participate in the ERFP.

Estimates of Levelized Cost of Electricity for Solid-Fuel Biomass

The *Biomass Strategic Value Analysis – Draft Staff Paper* estimated the trend in the levelized cost of electricity from a new 25 MW solid-fuel biomass fluidized bed combustor. Converting the constant dollar estimates to 2005 dollars, solid-fuel biomass fluidized bed combustor without PTC is estimated to be 7.1 cents/kWh for new plants online in 2005. The levelized cost of electricity is estimated to be 6.9 cents/kWh for 2007, 5.9 cents/kWh for 2010, and 5.3 cents/kWh in 2017.⁴⁰ Levelized costs for existing plants, some of which have been operational for almost 20 years, should be lower than new plants online in 2005 because debt incurred for capital costs should be nearly repaid.

Excluding ERFP incentives and the PTC, the staff estimates that existing solid-fuel biomass facilities receive between 7.37 to 7.87 cents/kWh on average from energy and capacity payments.⁴¹ This exceeds the estimated levelized costs for new 2005 solid biomass plants by 4 to 10 percent. In addition, a handful of facilities, including facilities that re-started during the energy crisis, are currently operating at revenue levels that are 1.5 to 2 cents/kWh less than the revenue that most existing biomass facilities receive.

Federal Production Tax Credit for Open-Loop Solid-Fuel Biomass

Furthermore, all open-loop (i.e., fueled by organic waste materials, rather than dedicated crops) biomass facilities are eligible for the federal PTC for five years starting in 2005. The PTC is anticipated to provide open-loop biomass facilities approximately 0.475 cents/kWh or 0.95 cents/kWh, depending on criteria specified in the law. These credits are adjusted annually.⁴² For comparison, average payments from ERFP during the past 12 months range from 0.33 cents/kWh to 1 cent/kWh.

The Federal PTC for wind and closed-loop (i.e., fueled by crops grown for this purpose) biomass is 1.9 cents/kWh for generation in 2005; however, as of October 2005, there are no closed-loop biomass facilities in the United States.

Capacity Payments Support Biomass Operation in Summer Months

Based on third-party verified data submitted by biomass facilities, staff has calculated that average annual capacity payments for biomass facilities range from 2 cents/kWh to 2.5 cents/kWh. The majority of these payments are provided during the summer months for generation during peak and partial peak hours.

Facilities need to operate the majority of the summer peak and partial peak hours to receive their full capacity payments. The biomass facilities are therefore likely to operate during these time periods regardless of whether they receive any additional incentives. Summer peak and partial peak capacity payments are equivalent to about 10 cents/kWh, providing a substantial increase in revenue during these periods.

Chapter 4 Endnotes

³⁵ Twenty-eight solid-fuel biomass facilities are currently participating in the ERFP. There are 22 existing solid-fuel biomass facilities under PG&E standard offer contracts; all but one of which are Standard Offer 4 (SO4) contracts. The one that does not currently have an SO4 contract, had an SO4 contract previously, but it expired. Now this facility has an Standard Offer 1 contract, which is based on the short-run avoided cost for energy (SRAC). About five years ago, facilities holding SO4 contracts were offered a fixed price for energy payments of 5.37 cents/kWh as a five-year amendment to their contracts. Of the 21 PG&E facilities that currently have SO4 contracts, 20 are paid under this option and one is paid according to the SRAC. The SRAC is currently high; for example, in September 2005, the SRAC for PG&E was 7.79 cents/kWh. The SRAC changes monthly. In addition to the 22 standard offer contracts with PG&E, one existing biomass facility is under a SO4 contract with SCE. In addition, three re-started biomass facilities have negotiated contracts with PG&E, one has a contract with SDG&E, and one facility has a contract with Sierra Pacific Power.

³⁶ SB 1194 (Sher), Chapter 1050, Statutes of 2000, http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_1151-1200/sb_1194_bill_20000930_chaptered.pdf, accessed October 25, 2005.

³⁷ As a result of the Energy Crisis of 2000-2001, California has developed a hybrid market to avoid possible excesses from either an oligopolistic or fully competitive market for the provision of electricity. Although the state's electricity market is not fully competitive, the state's load-serving entities offer contracts to independent renewable energy providers through all source and RPS competitive solicitations, fixed-price and variable-price standard offer contracts, and negotiated bilateral contracts. See California Energy Commission, March 1997, *Policy Report on AB 1890 Renewables Funding, Report to the Legislature*, P500-97-002, http://www.energy.ca.gov/reports/1997_AB1890_RPT2LEGI.PDF, accessed October 19, 2005.

³⁸ Office of the Governor of California, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005

³⁹ California, Office of the Governor, June 1, 2005, Executive Order S-3-05, http://www.governor.ca.gov/state/govsite/gov_homepage.jsp, click on "Press Room," accessed October 15, 2005.

⁴⁰ California Energy Commission, June 2005, *Biomass Strategic Value Analysis – Draft Staff Paper* <http://www.energy.ca.gov/2005publications/CEC-500-2005-109/CEC-500-2005-109-SD.PDF>, accessed October 15, 2005, pp. 56, 60. For comparison, levelized cost of electricity estimates prepared by Navigant in the *Renewable Resources Development Report*, Appendix D, converted to 2005 dollars using the estimated GDP inflator are as follows: solid biomass direct combustion, without PTC (2005 dollars) is estimated to be about 6.8 cents/kWh for new plants online in 2005. The levelized cost of electricity is estimated to be 6.4 cents/kWh for 2008 and 2010, dropping to 5.8 cents/kWh in 2017. See <http://www.energy.ca.gov/renewables/02-REN-1038/documents/index.html>, Appendix D.

⁴¹ The estimated revenue is based on PG&E SO4 Power Purchase Agreements with average fixed energy payments of 5.37 cents/kWh, plus capacity payments of 2 cents/kWh to 2.5 cents/kWh.

⁴² US Energy Policy Act of 2005 [Public Law 109-58 (HR6), Section 1301.]

CHAPTER 5: CONSUMER INFORMATION AND MARKET SUPPORT PROGRAM

The Consumer Information and Market Support Program (previously called the Consumer Education Program) has provided California consumers with information about renewable energy and its benefits through public service announcements, events, radio, television, newspaper and magazine articles, and informational materials for consumers, builders, installers, and public officials. This program has provided funds totaling more than \$5 million for market research, 21 outreach and demonstration project grants, and two public awareness campaign contracts. In addition, Customer Credit funds reallocated to the Consumer Information and Market Support Program have been used to launch the Western Renewable Energy Generation Information System (WREGIS). WREGIS will use RECs to track renewable generation and procurement. Delivery of procured RPS energy to California will be tracked separately.

Under SB 1038, one percent of the RRTF funds collected between January 1, 2002, and January 1, 2007, were allocated to this element of the Renewable Energy Program, approximately \$5.4 million over five years. In response to the CPUC's decision to limit direct access, approximately \$5 million from the Customer Credit Program has been redirected to this program.

Policy Context

Sustainable Solar Market Development

The Governor has set a goal, consistent with previous administrations, of achieving a sustainable solar energy market. Moreover, the Governor has set specific numerical targets for the installation of 1 million solar energy systems or the equivalent of 3,000 MW by 2018.⁴³ The solar energy systems are to be DG PV systems supplying electricity for on-site use.

California has been providing incentives for the installation of DG PV in IOU service territories since 1998, through the Energy Commission's ERP and the CPUC's Self-Generation Incentives Program.

As of September 30, 2005, there was a cumulative total of about 16,000 PV systems installed in California, representing 130 MW. Of these, about 14,400 PV systems were installed in IOU service areas, with 97 percent (45 percent of the total MW) receiving support from the ERP and 3 percent (32 percent of the total MW) receiving support from the CPUC Self-Generation Incentive Program. The remaining 1,600 systems (23 percent of the total MW) were installed in publicly owned utility service areas.

To reach the Governor's numerical goal, California will have to install, on average, almost 300 MW per year for the next ten years. The number of systems installed, however, would likely follow an exponential growth curve with fewer systems installed in the early years and a much greater number of systems installed in the later years. Depending on how incentive programs are structured, achieving these numerical targets may or may not lead to the ultimate goal of a sustainable solar energy market.

Thus far, leading edge individuals, builders, and commercial businesses have participated in helping California reach current levels of installed DG PV. These parties are well positioned to build on their current knowledge to help the state reach the new target; but to reach this ambitious goal, many newcomers are needed as well. Further Consumer Information and Market Support Program activities are needed to encourage and assist these newcomers to enter the solar energy market and to provide continued assistance to current market participants.

Western Renewable Energy Generation Information System

We also recommend continuing to use funds from the Consumer Information and Market Support Program to support the WREGIS. The WREGIS is being developed in response to SB 1078, which requires the Energy Commission to:

Design and implement an accounting system to verify compliance with the renewables portfolio standard by retail sellers, to ensure that renewable energy output is counted only once for the purpose of meeting the renewables portfolio standard of this state or any other state, and for verifying retail product claims in this state or any other state.⁴⁴

The WREGIS will track RECs created by the generation of RPS-eligible energy within the WECC, and is expected to be operational in early 2007.

The Energy Commission plans to use North American Electricity Reliability Council (NERC) tags in conjunction with the WREGIS to verify delivery of RPS energy into California.⁴⁵ Pursuant to CPUC Decision 05-07-039, California IOUs must accept RPS energy delivered to any point within the California Independent System Operator (CA ISO) service territory and may accept RPS energy delivered into other points in California.⁴⁶ Out-of-state facilities are subject to the same deliverability requirements as in-state facilities. Generation that will be counted for purposes of RPS compliance from out-of-state facilities must be delivered to an in-state market hub (also referred to as "zone") or in-state substation (also referred to as "node") located within California. The specific in-state delivery location will be designated by the contracting IOU under the power purchase contract between the IOU and facility or renewable supplier, consistent with CPUC Decision 05-07-039.

The WREGIS is being designed to track California's RPS procurement and also be flexible enough to meet the REC-tracking needs of a broad range of renewable energy markets. For example, many other states and municipalities within the WECC have their own RPS programs, and the eligibility requirements differ from one program to the next.⁴⁷ In addition to these regulatory markets, there is a growing voluntary market for RECs. The WREGIS is being designed to attract as broad a range of market participants as reasonably possible by accommodating the needs of these various entities in the WECC, such as recognizing program-specific eligibility requirements. The intent is to spur robust participation and best meet California's legislative intent by tracking a broad scope of renewable energy generation.

The Governor has encouraged the Legislature to "enable a tradable credit or other system to encourage development of the vast renewable resources available throughout the West."⁴⁸ Although there is interest in allowing limited trading in unbundled RECs in the near term as part of California's ESP and CCA RPS programs, currently the California RPS requires the tracking of energy as well as RECs used to meet the IOUs' RPS requirements.⁴⁹ To meet this need, the Energy Commission plans to utilize data from WREGIS and NERC-tag data to verify delivery of RPS-eligible energy to California.⁵⁰ It should be noted that the WREGIS is not being designed to provide REC-trading services.

Other Emerging Renewables

As directed by AB 1890 and subsequent legislation, the Consumer Education program element has also prepared and distributed materials to promote the installation of non-PV emerging renewable technologies, such as small wind electricity generation systems of less than 50 kW, fuel cells that convert renewable fuels into electricity, and solar thermal. Although these non-PV technologies represent a small portion of the systems that have been funded in the ERP, they provide value by diversifying California's electricity generation technologies and fuel sources. The Consumer Information and Market Support Program element should continue to support these technologies.

Recommended Allocation

To meet the state's new policy priorities for renewable energy, we recommend allocating 4 percent of the RRTF to the Consumer Information and Market Support (an increase from 1 percent under SB 1038). These funds will support training and outreach to support the Governor's goal of ramping up to 3,000 MW of distributed generation PV, WREGIS, and other Consumer Information and Market Support activities. This allocation would provide about \$28 million for five years or an average of about \$5.6 million per year.

Pursuant to the guidebook process, staff plans to develop an updated Consumer Information and Market Support Plan (Marketing Plan).⁵¹ Initially, most of the funds are expected to be used for marketing and education materials in support of the Governor's goal of reaching a sustainable solar energy market, although details regarding this program are still undecided. The remaining funds would be used to support the WREGIS, other emerging renewables, and general consumer information and marketing-building activities. A brief description of the activities undertaken for each of the elements of the Marketing Plan is provided below.

Sustainable Solar Energy Market

We anticipate that the primary activities undertaken in support of the sustainable solar energy market will focus on education and facilitating solar industry integration and standards. These activities will be consistent with the Governor's goal and SB 1, which is still pending before the Legislature, or the CSI program implementation. As of September 2005, the draft text of SB 1 would require the Energy Commission to do the following:

- Publish educational materials designed to demonstrate how builders may incorporate solar energy systems during construction as well as energy efficiency measures that best complement solar energy systems.
- Provide assistance to builders and contractors in support of the Governor's solar roofs initiative. The assistance may include technical workshops, training, educational materials, and related research.

In addition to these core activities, a statewide PV marketing campaign may be required to reach the Governor's numerical targets for PV installations. An allocation of \$3 million to \$7 million per year for targeted market support activities may be warranted if PV installations do not ramp up as quickly as needed to reach the Governor's goals.⁵²

Western Renewable Energy Generation Information System

Although SB 1078 required the development of a tracking system for the RPS program, it did not specifically allocate funding for this purpose. Consequently, the Energy Commission has used funding from the Customer Credit Program element transferred to the Consumer Education Program element to support the WREGIS. The staff recommends that the Energy Commission's authority under the Consumer Education Program be clarified to explicitly address the WREGIS.

Other Emerging Renewables

We also plan to conduct activities to support other emerging renewable technologies, including distributed generation wind, fuel cells, and solar thermal electric. We anticipate conducting training, education and outreach for local building department personnel and inspectors, building contractors, installers and engineers. These activities will likely lower the costs, reduce delays, and improve the installation quality of wind, fuel cell, and other technologies included in this element.

General Consumer Information and Market Support

The Renewable Energy Program may be called upon to provide information, research, evaluations, or market support activities that fall outside of the other Consumer Information and Market Support Program elements but would rightly fall within this program's purview and objectives. Therefore, to provide program flexibility and organization, we recommend creating a General Consumer Information and Market Support component of this program.

Needed Flexibility

We recommend maintaining the flexibility to reallocate funds from Consumer Information and Market Support to other elements of the Renewable Energy Program in response to market conditions.

Chapter 5 Endnotes

⁴³ As of September 2005, both Senate Bill 1 (Murray), regarding the Governor's Million Solar Roofs Initiative, and the CPUC's Solar Assigned Commissioner Ruling R.04-03-017 included these goals.

⁴⁴ Public Utilities Code section 399.13, subd.(b).

⁴⁵ See California Energy Commission, August 2004, *Renewables Portfolio Standard Eligibility Guidebook*, http://www.energy.ca.gov/portfolio/documents/guidebooks/2004-08-20_500-04-002F1.PDF, accessed October 12, 2005, pp. 18-19. The Energy Commission plans to update the guidebook to be consistent with Decision 05-07-039 in January 2006.

⁴⁶ CPUC, July 21, 2005, *Opinion Approving Procurement Plans and Requests for Offers for 2005 RPS Solicitations*, Rulemaking 04-04-026, http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/48266.doc, accessed October 12, 2005, pp. 7-11, 41-42.

⁴⁷ For information on RPS programs in other states, the Database of State Incentives for Renewable Energy, <http://www.dsireusa.org>. For information on publicly owned utility RPS programs in California, see California Energy Commission, (forthcoming 2005), *Publicly Owned Electric Utilities and the California RPS: A Summary of Data Collection Activities, Draft Consultant Report*, prepared by KEMA, Inc., <http://www.energy.ca.gov/reports/>.

⁴⁸ California Office of the Governor, Letter to the Honorable Don Perata, President pro tempore of the Senate of California, August 23, 2005, "Review of Major Integrated Energy Policy Report Recommendations," http://www.energy.ca.gov/energypolicy/2005-08-23_GOVERNOR_IEPR_RESPONSE.PDF, accessed October 3, 2005, p. 6.

⁴⁹ CPUC, July 21, 2005, *Opinion Approving Procurement Plans and Requests for Offers for 2005 RPS Solicitations*, Rulemaking 04-04-026, http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/48266.doc, accessed October 12, 2005, pp. 7-11, 41-42.

⁵⁰ For information on NERC's e-tag system, see "NERC Electronic Tagging Version 1.7 Home Page," <http://reg.tsin.com/Tagging/e-tag/>, accessed October 12, 2005.

⁵¹ Energy Commission, February 1999, *Renewable Energy Consumer Education Marketing Plan*, P500-99-018.

⁵² California Energy Commission, October 30, 2000, *Renewable Energy Program Preliminary Evaluation, Consultant Report*, prepared by Regional Economic Research, Inc. This independent evaluation of the Renewable Energy Program, recommended an allocation of \$3 million to \$7 million per year at a minimum to successfully implement a multi-faceted approach to developing a consumer market for renewable energy in California. Although this evaluation referenced green energy marketing, staff anticipate that a statewide marketing campaign in support of a sustainable solar market on the scale of the Governors goal would likely require a similar outlay of funds.

ACRONYMS

CCA	community choice aggregator
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
DG	distributed generation
ERFP	Existing Renewable Facilities Program
ERP	Emerging Renewables Program
ESP	electric service provider
GHG	greenhouse gas
IOU	investor-owned utility
kW	kilowatt
Mcf	thousand cubic feet
MMcfd	million cubic feet per day
MPR	market price referent
MW	megawatt
NRFP	New Renewable Facilities Program
POU	publicly owned utility
PRC	Public Resources Code
PV	photovoltaic
REC	renewable energy certificate
RESIA	Reliable Electric Service Investments Act
RFO	request for offer
RPS	Renewables Portfolio Standard
RRTF	Renewable Resource Trust Fund
SCE	Southern California Edison
SDG&E	San Diego Gas and Electric
SEP	supplemental energy payment
SRAC	short run avoided cost
SO4	standard offer 4
WECC	Western Electricity Coordinating Council
WREGIS	Western Renewable Generation Information System

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